

DRAFT ILLUSTRATED KEY TO THE PLANT ASSOCIATIONS OF FLORISSANT FOSSIL BEDS NATIONAL MONUMENT

A diverse assemblage of plant associations or vegetation types were observed and characterized during the summer of 2001 under the National Park Service, Vegetation Mapping Program. To assist in the accurate field identification of 42 plant associations described for Florissant Fossil Beds National Monument during vegetation map production, this dichotomous key, illustrated with images taken during the vegetation sampling effort, has been prepared. It is the intent of the key to allow identification of plant associations with one or a combination of dominant species. For sites that occupy ecotones (areas where dominant species intermix between plant associations), it may be difficult to determine a definitive association name. This illustrated key also allows the user to crosswalk plant associations directly to the Florissant Fossil Beds National Monument vegetation map so that all research can have a common focal point, relative to the baseline year of aerial photography (1996) and field data (2001).

HOW TO USE THIS KEY:

The key approaches plant association identification at two levels. The first level is physiognomic, allowing the user to determine which major group is being evaluated, i.e., forest, woodland, tall shrubland, shrubland, dwarf shrubland, graminoid, or forb. The second level allows identification to plant association based on dominant species foliar cover.



KEY I.

A KEY TO THE MAJOR PHYSIOGNOMIC GROUPS OF FLORISSANT FOSSIL BEDS NATIONAL MONUMENT

- 1) Vegetation woody or appearing woody; predominantly trees, shrubs, or shrub-like herbs (includes the suffrutescent perennial *Artemisia frigida*) (2)
 - 1) Vegetation non-woody; predominantly grasses, grass-like herbs (graminoids), and broad-leaf herbs (forbs), which may be quite tall and coarse (3)
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- 2) Vegetation of forest (predominantly of interlocking tree canopies) or woodland (predominantly non-interlocking tree canopies) (**Key IIA - Page 5**)
Characteristic genera include: Picea, Pseudotsuga, Pinus, Populus
 - 2) Vegetation of tall shrub, shrub, dwarf shrub, or shrub-like herbs, canopies may interlock but are more commonly less dense (**Key IIB - Page 11**)
Characteristic genera include: Betula, Alnus, Salix, Dasiphora, Cercocarpus, Chrysothamnus, Ericameria, Yucca, Artemisia
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- 3) Vegetation of tall and dense, exotic forbs; low-growing and sparse caespitose forbs; or floating and/or submerged aquatic forbs (**Key IIC - Page 18**)
Characteristic genera include: Cirsium, Linaria, Paronychia, Lemna, Myriophyllum, Ranunculus
 - 3) Vegetation of grasses and graminoids (4)
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- 4) Vegetation of graminoids, growing in wet or moist soils (**Key IID - Page 21**)
Characteristic genera include: Carex, Juncus
 - 4) Vegetation of grasses, growing in moist to dry soils and on gravel (**Key IIE - Page 23**)
Characteristic genera include: Agropyron, Bouteloua, Bromus, Danthonia, Festuca, Hesperostipa, Hordeum, Muhlenbergia, Nassella, Pascopyrum, Phalaris, Schizachyrium

KEY II.

KEYS TO THE MAJOR PLANT ASSOCIATIONS OF FLORISSANT FOSSIL BEDS NATIONAL MONUMENT

Typical Landscapes of Florissant Fossil Beds National Monument.

Figure 1. Forest and Woodland Vegetation Types (Key IIA)

Figure 2. Shrubland Vegetation Types (Key IIB)

Figure 3. Forbland Vegetation Types (Key IIC)

Figure 4. Graminoid Vegetation Types (Key IID)

Figure 5. Grassland Vegetation Types (Key IIE)



Figure 1. Forest and Woodland Vegetation Type



Figure 2. Shrubland Vegetation Type



Figure 3. Forbland Vegetation Type



Figure 4. Graminoid Vegetation Type



Figure 5. Grassland Vegetation Type

KEY IIA.

**A KEY TO THE FOREST AND WOODLAND ASSOCIATIONS OF
FLORISSANT FOSSIL BEDS**

- 1) Forest associations of evergreen or deciduous trees with interlocking canopies, generally providing 60% or greater foliar cover and occupying northern exposures or moist drainages with many exposures (2)
- 1) Woodland associations of mostly evergreen trees, with canopy openings, generally providing 25-60% foliar cover, often with scattered sapling trees or shrubs present in openings, and occupying southern and western exposures or hill and ridge tops (6)
- 2) Forest association of deciduous trees growing adjacent to moist drainages, on moist slopes, or along mesic toeslopes. Tree stands dominated by quaking aspen in the overstory and shrub, forb, or grass species in the understory (3)
- 2) Forest associations of evergreen trees, often with scattered quaking aspen trees present (4)



- 3) *Populus tremuloides* understory dominated by low-growing shrubs – *Populus tremuloides* / *Juniperus communis* (Quaking aspen / Common juniper) Forest [Mapping Unit # 11]
- 3) *Populus tremuloides* understory dominated by graminoids and/or forbs – *Populus tremuloides* (Quaking aspen) Forest [Mapping Unit # 11]



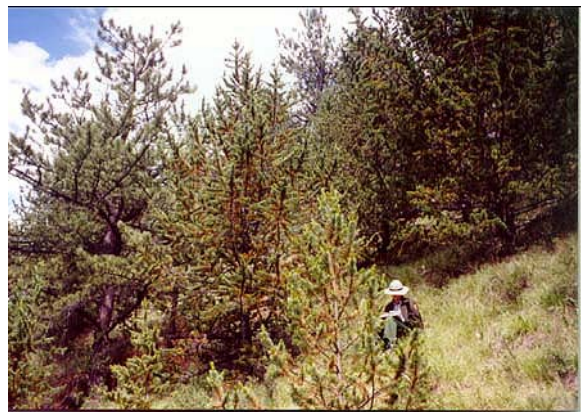


- 4) Forest association of *Pseudotsuga menziesii* trees with the needles attached directly to the branch, cones with exserted, three-pronged scales, understory includes common juniper shrubs, stands occupy north- to east-facing slopes and drainage sides with several aspects – *Pseudotsuga menziesii* / *Juniperus communis* (Douglas-fir / Common juniper) Forest [Map Units # 3 or 4]
- 4) Forest association of *Picea pungens* trees, with sharp-pointed needles attached to a short peg on the branch and cones with papery bracts, understory usually includes common juniper shrubs, stands occupy north- to east-facing slopes and drainage bottoms – *Picea pungens* / *Juniperus communis* (Colorado blue spruce / Common juniper) Forest [Map Units # 3 or 4]





- 6) Woodland association of deciduous trees along a perennial stream (canopy closure in stand may exceed 60%) – *Populus balsamifera* (Balsam Poplar) Woodland [Map Unit # 10]
- 6) Woodland associations of evergreen trees (7)



- 7) Woodland association of small- to medium-size *Pinus aristata* trees, characterized by five thin needles per fascicle or group, with visible drops of resin, stands occupy steep, northwest-facing slopes – *Pinus aristata* / *Festuca arizonica* (Bristlecone Pine / Arizona Fescue) Woodland [Map Unit # 5]
- 7) Woodland associations of large, single-needle *Picea pungens* along drainages or small to large *Pinus ponderosa* trees, characterized by three thick and long needles per fascicle or group, with no resin on the needles, stands occupy south, east, and west-facing slopes, hilltops, and ridgetops (8)



- 8) Woodland association of single-needle *Picea pungens* trees emerging from a *Betula occidentalis* riparian shrubland *Picea pungens* / *Betula occidentalis* (Colorado blue spruce / River birch) Woodland [Not Mapped - below MMU]
- 8) Woodland association of three-needle *Pinus ponderosa* trees emerging from an upland shrubland or grassland (9)



- 9) Woodland association of young *Pinus ponderosa* trees becoming established on an exotic, *Bromus inermis* grassland (former pasture) – *Pinus ponderosa* / *Bromus inermis* (Ponderosa pine / Smooth brome) Semi-natural Woodland [Map Unit # 9]
- 9) Woodland association of mature *Pinus ponderosa* trees (some seedlings or saplings may be present but are not dominant), occupying south, east, and west-facing slopes, hilltops, and ridgetops (10)



- 10) Woodland association of *Pinus ponderosa* mixed with openings of grass species. Canopy closure may exceed 60% on some north-facing slopes – *Pinus ponderosa* / *Festuca arizonica* (Ponderosa pine / Arizona fescue) Woodland [Map Unit # 7]
- 10) Woodland association of *Pinus ponderosa* with openings supporting *Cercocarpus montanus* shrubs and grass understory species – *Pinus ponderosa* / *Cercocarpus montanus* (Ponderosa pine / Mountain mahogany) Woodland [Map Unit # 8]



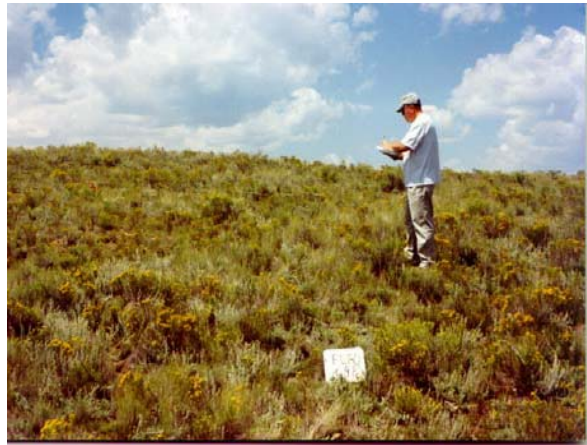
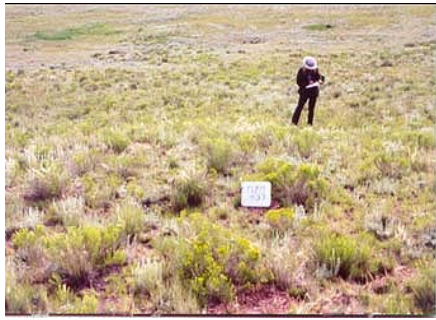
KEY IIB.

A KEY TO THE SHRUBLAND ASSOCIATIONS OF FLORISSANT FOSSIL BEDS NATIONAL MONUMENT

- 1) Plant associations of dwarf shrubs, less than 0.5 m tall, occupying dry sites of southern exposures (2)
- 1) Plant associations of shrubs greater than 0.5m tall, occupying a variety of sites and exposures (4)



- 2) Dwarf shrub association resulting from heavy grazing by prairie dogs, prairie dog burrows and mounds present, typically located on nearly flat slopes (1-5%) and deep soils – *Artemisia frigida* / *Bouteloua gracilis* (Fringed Sage-wort / Blue Grama) Dwarf-shrubland [Map Unit # 15]
- 2) Dwarf shrub associations typically located on steeper slopes (5-20%) and shallow soils, low density prairie dog burrows and mounds may be present (3)



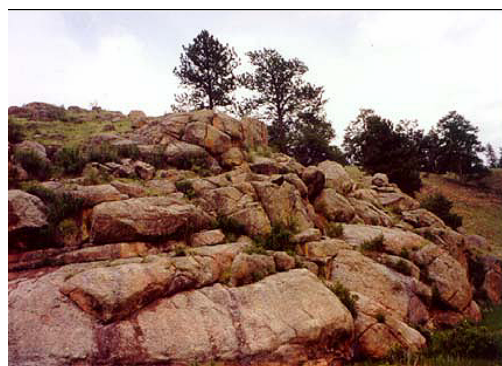
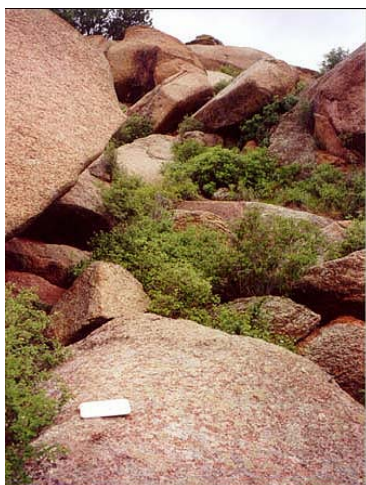
- 3) Dwarf shrub association of deciduous shrubs growing on low-elevation hill-slopes and ridge-slopes (5-10%), at the lowest monument elevations, a few prairie dog burrows and mounds may be present — *Chrysothamnus viscidiflorus* — *Ericameria parryi* (Viscid Rabbitbrush — Parry Rabbitbrush) Shrub Herbaceous Vegetation [Not Mapped - below minimum mapping unit]
- 3) Dwarf shrub association of evergreen shrubs with spiny leaves, growing on mid- to upper-elevation gravel slopes (10-30%) — *Yucca glauca* / *Muhlenbergia montana* (Soapweed / Mountain muhly) Shrubland [Map # 31]



- 4) Shrub associations of moderate-stature plants growing on dry, upland sites, e.g., slopes and rock outcrops (5)
- 4) Shrub associations of moderately tall to tall plants growing on mesic to saturated sites of swales and drainages (8)
- 5) Shrub associations growing from the crevices and around the base of large rocks and boulders or from platy, volcanic rocks (6)
- 5) Shrub associations growing from dry-slopes and hilltops of gravel and thin soil (7)



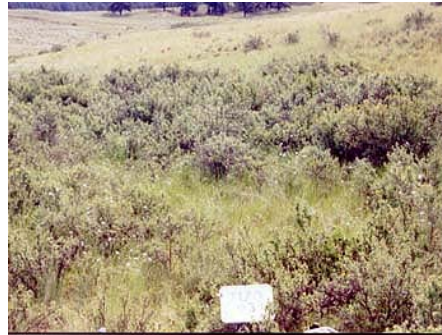
- 6) Shrub association growing from platy volcanic rocks, exposed on steep slopes adjacent to upper Grape Creek – *Prunus virginiana* - (*Prunus americana*) (Chokecherry - (American Plum)) Shrubland [Not Mapped-below MMU]
- 6) Shrub association growing from joints, cracks, or around the base of Pikes Peak granite boulders, exposed on steep slopes, or occurring as jumbles of boulders on toeslopes – *Jamesia americana* (Waxflower) Rock Outcrop Shrubland [Map Unit # 18]





- 7) Shrub association consisting of one stand of *Elaeagnus commutata* growing from a west-facing slope on volcanic rock and soil – *Elaeagnus commutata* (Silverberry) Shrubland [Not Mapped - below MMU]
- 7) Shrub association growing from gravelly soils of hillslopes and ridgeslopes, often in canopy openings of *Pinus ponderosa* woodlands – *Cercocarpus montanus* / *Muhlenbergia montana* (Mountain Mahogany / Mountain Muhly) Shrubland [Map Unit # 16]





- 8) Shrub association of rounded plants from 0.5-1m tall, growing in mesic swales and along perennial streams – *Dasiphora fruticosa* (Shrubby Cinquefoil) Temporarily Flooded Shrubland Alliance [Map Unit # 17]
- 8) Shrub association of tall plants of the genera *Alnus* and *Salix*, from 2-5m tall, growing along perennial streams or around beaver ponds (9)



- 9) Shrub association of small, linear stands of *Alnus incana* growing along perennial streams – *Alnus incana* / Mesic Graminoids (Speckled Alder / Mesic Graminoids) Shrubland [Map Unit # 14]
- 9) Shrub associations of linear stands of *Salix* growing along perennial streams (10)



- 10) Shrub association of medium to tall *Salix* with long (6-8 cm), linear leaves – *Salix exigua* (Sandbar / Coyote Willow) Temporarily Flooded Shrubland [Map Unit # 20]
- 10) Shrub associations of various heights, willows with broader and shorter leaves than described above (11)



- 11) Shrub association of medium-tall (2-3 m tall) *Salix* with brown to purple-colored stems, growing with aquatic sedge – *Salix brachycarpa* / *Carex aquatilis* (Short-fruit Willow / Aquatic Sedge) Shrubland [Map Unit # 19]
- 11) Shrub association of tall (3-5m tall) *Salix* with yellow-colored stems (12)

- 12) Shrub association of tall (3-5m tall) *Salix* with large bracts at the base of the leaves, growing with a *Carex utriculata* or mesic graminoid understory (13)



- 12) Shrub association of tall (3-5m tall) *Salix* without large bracts at the base of the leaves, growing with a variety of graminoids and forbs – *Salix lutea* (Yellow Willow) Shrubland [Not Mapped - below MMU]



- 13) *Salix monticola* shrubs with an understory of predominantly *Carex utriculata* - *Salix monticola* / *Carex utriculata* (Mountain Willow / Beaked Sedge) Shrubland [Map Unit # 21]

- 13) *Salix monticola* shrubs with an understory of mixed grasses / sedges, and rushes - *Salix monticola* / Mesic graminoids (Mountain Willow / Mesic graminoids) Shrubland [Map Unit # 21]



KEY IIC.

**A KEY TO THE FORB ASSOCIATIONS OF
FLORISSANT FOSSIL BEDS NATIONAL MONUMENT**

- 1) Floating or submerged aquatic plants of beaver ponds and historic livestock ponds (2)
- 1) Forb associations of moist or dry soils, but never floating or submerged aquatics (3)



- 2) Aquatic plants, bright green to gray-green in color, floating on the water surface creating a mat – *Lemna* spp. (Duckweed) Permanently Flooded Herbaceous Vegetation [Map Unit # 23]
- 2) Aquatic plants, dark green, submerged beneath the water surface and rooted in the bottom substrate – *Myriophyllum sibiricum* (Water Milfoil) Herbaceous Vegetation [Map Unit # 23]



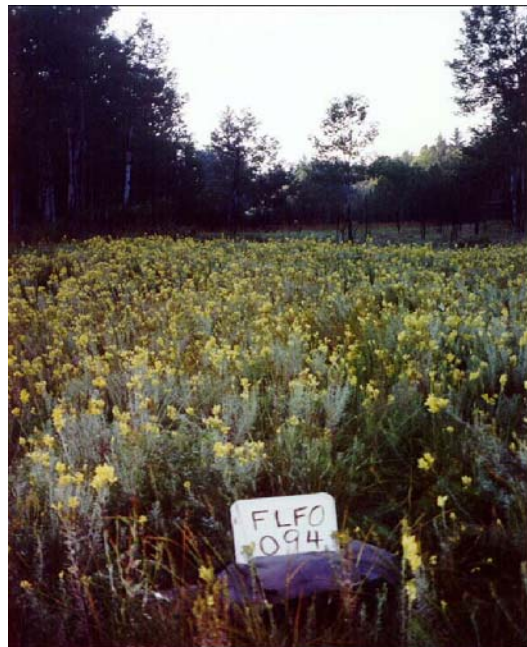


- 3) Forb association mostly native, caespitose (mat or cushion plants) perennials occupying a dry upland excavation – *Paronychia sessiliflora* (Nailwort) Herbaceous Vegetation [Not Mapped - below MMU]
- 3) Forb associations mostly exotic, rhizomatous (growing in patches, plants connected by underground stems), perennials occupying moist and deep floodplain or swale soils (4)



- 4) Forbs 0.5-1 m tall, flower color lavender to purple, leaves prickly, greater than 1 cm wide – *Cirsium arvense* (Canada Thistle) Herbaceous Vegetation [Map Unit # 22]

- 4) Forbs 0.5-1 m tall, flower color yellow, leaves smooth, less than 1 cm wide – *Linaria vulgaris* (Toadflax or Butter-and-Eggs) Herbaceous Vegetation [Map Unit # 24]



KEY IID.

**A KEY TO THE GRAMINOID ASSOCIATIONS OF
FLORISSANT FOSSIL BEDS NATIONAL MONUMENT**

- 1) Graminoid associations of saturated soils and standing water, growing along stream channels and on saturated peat (quaking bogs) (2)
- 1) Graminoid associations of saturated to moist soils, but slightly higher within the floodplain (not immediately adjacent to the stream channel) or on the outermost portion of the floodplain (3)

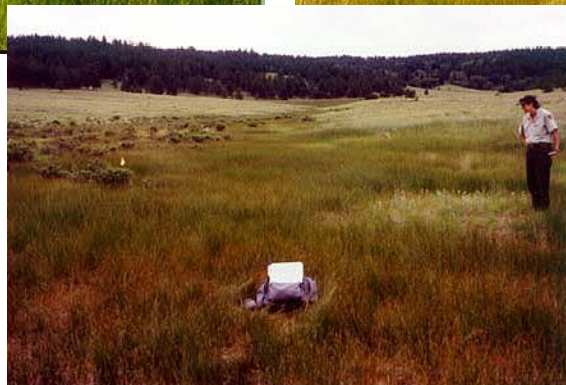


- 2) Sedge association a patch or small stand of tall (0.5-1 m), blue-green sedge growing adjacent to the stream channel – *Carex nebrascensis* (Nebraska Sedge) Herbaceous Vegetation [Not Mapped - below MMU]
- 2) Sedge association a linear stand of tall (0.5-1 m), yellow-green sedge growing adjacent to the stream channel or broader stands on first terraces growing from saturated soils – *Carex utriculata* (Beaked Sedge) Herbaceous Vegetation [Map Unit # 26]





- 3) Sedge association a linear to broad stand of tall (0.5-1 m), blue-green sedge with pale blue leaf tips, growing on saturated soil or peat on the outer first-terrace of the stream floodplain – *Carex aquatilis* (Aquatic Sedge) Herbaceous Vegetation [Map Unit # 26]
- 3) Rush association a linear to broad stand of tall (0.5-1 m), dark green rush, growing on moist to saturated soils along the outer floodplain margins – *Juncus balticus* (Baltic or Arctic Rush) Herbaceous Vegetation [Map Unit # 26]



KEY IIE.

A KEY TO THE GRASSLAND ASSOCIATIONS OF FLORISSANT FOSSIL BEDS NATIONAL MONUMENT



- 1) Grassland association of an annual, exotic bunchgrass, occupying dried ponds – *Hordeum jubatum* (Foxtail Barley) Herbaceous Vegetation [Map Unit # 29]
- 1) Grassland associations of perennial, exotic or native species, occupying a variety of habitats (2)
- 2) Grassland associations of exotic grasses, occupying moist or dry, previously disturbed habitats and soils (3)
- 2) Grassland associations of native grasses, occupying moist or dry, relatively undisturbed habitats and soils (5)



- 3) Grassland association of uplands, dominated by the bunchgrass *Agropyron cristatum*, introduced for erosion control and livestock forage on the water pipeline (aqueduct) corridor, on old fields leveled and terraced for seed potato production, and as a pasture grass – *Agropyron cristatum*—(*Pascopyrum smithii*, *Hesperostipa comata*) (Crested Wheatgrass - (Western Wheatgrass, Needle-and-Thread)) Semi-natural Herbaceous Vegetation [Not Mapped]
- 3) Plant association of uplands or of more mesic sites, dominant grasses rhizomatous (4)



- 4) Grassland association of upland to mesic sites, dominated by the tall (0.5-1 m) *Bromus inermis*, introduced for erosion control and vegetative cover in road rights-of-way, within drainages and floodplains, on the water pipeline (aqueduct) corridor, on old fields leveled and terraced for seed potato production, and as a pasture grass – *Bromus inermis* - (*Pascopyrum smithii*) (Smooth Brome - (Western Wheatgrass)) Semi-natural Herbaceous Vegetation [Map Unit # 25]
- 4) Grassland association on saturated wetland soils in the Boulder and Grape Creek drainages, dominated by the robust (1-2 m tall) *Phalaris arundinacea*, introduced for livestock forage or as a contaminant of imported livestock forage – *Phalaris arundinacea* (Reed Canarygrass) Western Herbaceous Vegetation [Not Mapped - below MMU]



- 5) Grassland associations predominantly of rhizomatous or stoloniferous grass species (6)
- 5) Grassland associations predominantly of bunch grass species (8)



- 6) Grassland association dominated by a medium-tall (0.25-0.5 m tall) cool-season grass species of deep, mesic floodplain terrace soils – *Pascopyrum smithii* – *Nassella viridula* (Western Wheatgrass – Green Needlegrass) Herbaceous Vegetation [Not Mapped - below MMU]
- 6) Grassland association dominated by short (0.10-0.25 m tall) warm-season grass species of thin, dry hilltop, slope, and ridgetop soils (7)



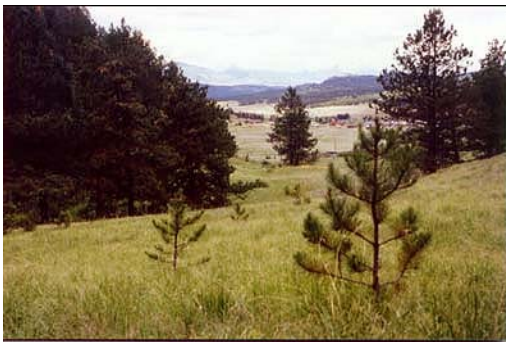
- 7) Grassland association of deeper (to 10 cm) soils of slopes of drier hills and ridges the dominant species taller than 10 cm - *Muhlenbergia montana* (Mountain Muhly) Herbaceous Vegetation [Map Unit # 28]
- 7) Grassland association of thinner soils atop hills and ridges, the dominant species typically shorter than 10 cm - *Muhlenbergia filiculmis* (Slimstem Muhly) Herbaceous Vegetation [Map Unit # 30]



- 8) Grassland associations of nearly monotypic stands of bunchgrass (9)
- 8) Grassland associations with a diverse bunchgrass community (10)



- 9) Grassland association located on dry gravels of steep (10-30%) slopes with southern exposures - *Schizachyrium scoparium* (Little Bluestem) Herbaceous Vegetation [Map Unit # 31]
- 9) Grassland association located on mesic soils of moderate (5-10%) slopes with northern exposures - *Danthonia parryi* (Parry Oatgrass) Herbaceous Vegetation [Map Unit # 27]





- 10) Grassland association rare, covering small patches on gravelly toeslopes of south-facing ridges on the north side of Boulder Creek, differing from the next plant association by the presence of *Hesperostipa comata*, a cool season bunchgrass - *Muhlenbergia montana* - *Hesperostipa comata* (Mountain Muhly—Needle-and-thread) Herbaceous Vegetation [Not Mapped - below MMU]
- 10) Grassland association common, forming dense stands dominated by *Festuca arizonica* on hills and ridges and in swales and valleys of lower to middle elevations and less dense stands dominated by *Muhlenbergia montana* or *Muhlenbergia filiculmis* on open ridges, slopes, and hilltops of higher elevations (11)



- 11) Grassland association located on flats and on slopes of hills and ridges - *Festuca arizonica* - *Muhlenbergia montana* (Arizona Fescue - Mountain Muhly) Herbaceous Vegetation [Map Unit # 28]
- 11) Grassland association located on hilltops, ridgetops, and upper slopes, below the crown - *Festuca arizonica* - *Muhlenbergia filiculmis* (Arizona Fescue - Slimstem Muhly) Herbaceous Vegetation [Map Unit # 30]

